
The Nature of TiO₂ in Kaolinite

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Abstract: SEM, TEM, and electron probe studies indicate that the anatase in Georgia kaolins, and probably anatase in general, consists of subspherical particles (TiO₂ pellets) 0.05– 0.1 μm dia. Some pure anatase aggregates may be pseudomorphic after ilmenite and have a tabular shape, but much of the anatase is formed from Ti that occurs as scattered ions in the octahedral sheets of biotite. When removed from the biotite this material forms TiO₂ pellets. These pellets can occur as: single pellets; irregular aggregates; layered aggregates; spherical aggregates; mixed aggregates (with kaolinite); coated aggregates (with kaolinite). Physical energy can be used to break TiO₂—kaolinite aggregates, separate single TiO₂ pellets from kaolinite plates and remove kaolinite coatings from TiO₂ aggregates.

Al and Si are present in all TiO₂ aggregates and the Si—Al ratio is lower in the aggregates than in the kaolinite. An amorphous Si—Al compound may be present and act as a cement.

The anatase apparently is formed from Ti that is released from the parent mineral as Ti (OH)₄. The Ti (OH)₄ precipitates to form an amorphous hydrous oxide gel which dehydrates to form a granular aggregate of small anatase crystals.

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